

# Solar-Powered, Micron-Gap Thermophotovoltaics for MEO Applications, Phase I

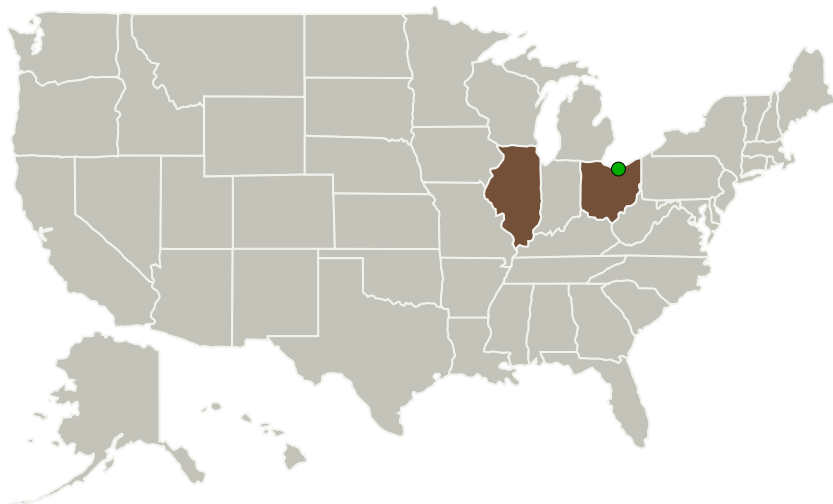
Completed Technology Project (2011 - 2011)



## Project Introduction

The proposed innovation is an InGaAs-based, radiation-tolerant, micron-gap thermophotovoltaic (MTPV) technology. The use of a micron wide gap between the radiation source and the photovoltaic substantially increases the efficiency of the thermophotovoltaic. This work will be accomplished by combining MicroLink's state-of-the-art InGaAs-based epitaxial lift-off solar cell structure on an InP substrate, and MTPV, LLC's leading-edge, micron-gap thermophotovoltaic device technology. The relevance of this innovation is that it addresses NASA's ongoing need for high-efficiency, lightweight, compact sources power for space vehicles. TPV is an attractive and technically feasible candidate for space power supplies, but its relatively poor efficiency performance has meant that it has not seen widespread use in space applications. However, MTPV technology, by bringing the emitter into the near field of the photovoltaic, couples an order of magnitude more power across the nano-scale vacuum gap than can be absorbed from the far-field spectrum and does so while maintaining the benefits of conventional TPV. MicroLink's ELO growth technology promises to further increase coupled power relative to the current germanium TPV cells while simultaneously reducing substrate costs. Thus, MicroLink ELO and MTPV technology can offer both high efficiency and reasonable cost TPV systems for the first time.

## Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
MicroLink Devices, Inc.	Lead Organization	Industry Minority-Owned Business	Niles, Illinois
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

## Primary U.S. Work Locations

Illinois	Ohio
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## Project Transitions

▶ **February 2011:** Project Start

✓ **September 2011:** Closed out

### Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138515>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

MicroLink Devices, Inc.

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

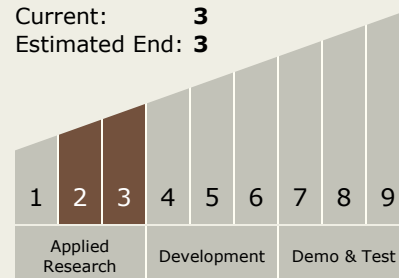
Carlos Torrez

### Principal Investigator:

Mark Osowski

## Technology Maturity (TRL)

Start: 2  
Current: 3  
Estimated End: 3



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## Technology Areas

### Primary:

- TX03 Aerospace Power and Energy Storage
  - └ TX03.1 Power Generation and Energy Conversion
    - └ TX03.1.6 Other Advanced Concepts for Generating/Converting Power

## Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System